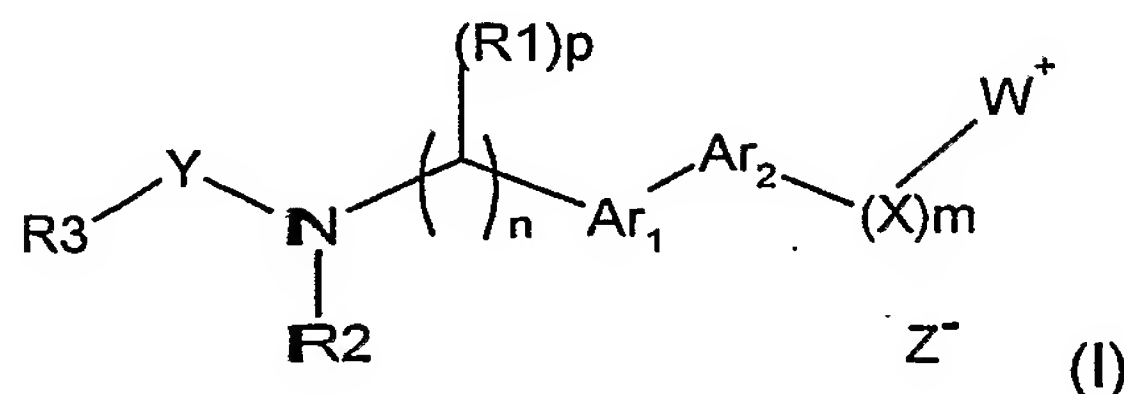


What is claimed is:

1. A compound according to formula I herein below:



wherein

Ar₁ and Ar₂, are independently, selected from the group consisting of optionally substituted phenyl and optionally substituted monocyclic heteroaryl;

W⁺ is N⁺R₆R₇R₈, or an optionally substituted saturated or partially unsaturated 4-10 membered ring system in which one or more rings contain one or more quaternary ammonium nitrogens, and optionally contain one or more secondary nitrogens, tertiary nitrogens, O, or S;

Z⁻ is a pharmaceutically acceptable counter ion, selected from the group consisting of I⁻, Br⁻, Cl⁻, F⁻, CF₃COO⁻, mesylate, and tosylate;

X is C(R₁)_p, or C(O); wherein, when X is C(R₁)_p, m is an interger from 0 to 3; when X is C(O), m is 1;

p is an interger from 0 to 2;

n is an interger from 0 to 3;

Y is C(O), S(O)_q, HNC(O), or OC(O); wherein, q is 1 or 2;

R₁ and R₂ are independently selected from the group consisting of hydrogen, optionally substituted C₁-C₁₀ alkyl, optionally substituted C₃-C₁₀ cycloalkyl, optionally substituted C₃-C₁₀ cycloalkyl alkyl, optionally substituted heterocyclic, optionally substituted heterocyclicalkyl, optionally substituted alkenyl, optionally substituted aryl, optionally substituted aryl alkyl, optionally substituted heteroaryl, and optionally substituted heteroaryl alkyl;

R₃ is selected from the group consisting of optionally substituted aryl, optionally substituted heteroaryl, optionally substituted alkenyl, optionally substituted C₁-C₁₀ alkyl, optionally substituted C₃-C₁₀ cycloalkyl, optionally

substituted C₃-C₁₀ cycloalkyl alkyl, optionally substituted aryl alkyl, and optionally substituted heteroaryl alkyl; wherein, when substituted, a group is substituted by one or more radicals selected from the group consisting of halogen, cyano, hydroxy, hydroxy substituted C₁-10alkyl, C₁-10 alkoxy, S(O)_{m'} C₁-10 alkyl, C(O)R₄, C(O)NR₄R₅; C(O)OH; S(O)₂NR₄R₅, NHC(O)R₄, NHS(O)₂R₄, C₁-10 alkyl, alkenyl, halosubstituted C₁-10 alkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted heteroaryl, optionally substituted heteroaryl alkyl, wherein these aryl or heteroaryl moieties may be substituted one to two times by halogen, hydroxy, hydroxy substituted alkyl, C₁-10 alkoxy, S(O)_{m'}C₁-10 alkyl, C₁-10 alkyl, or halosubstituted C₁-10 alkyl;
m' is 0, 1, or 2;

R₄ and R₅, are independently, selected from the group consisting of hydrogen, optionally substituted C₁-10 alkyl, optionally substituted alkenyl, optionally substituted C₃-C₁₀ cycloalkyl, optionally substituted C₃-C₁₀ cycloalkyl alkyl, optionally substituted aryl, optionally substituted aryl alkyl, optionally substituted heteroaryl, and optionally substituted heteroaryl alkyl; or R₄ and R₅ together with the nitrogen to which they are attached form a 5 to 7 member ring which may optionally comprise an additional heteroatom selected from O, and S; and

R₆, R₇, and R₈, are independently, selected from the group consisting of hydrogen, optionally substituted C₁-10 alkyl, optionally substituted alkenyl, optionally substituted C₃-C₁₀ cycloalkyl, optionally substituted C₃-C₁₀ cycloalkyl alkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted heteroaryl, optionally substituted heteroarylalkyl, optionally substituted heterocyclic, and optionally substituted heterocyclicalkyl; or R₇ and R₈ together with the nitrogen to which they are attached form a 5 to 7 member ring which may optionally comprise an additional heteroatom selected from O, N and S;

or any other pharmaceutically acceptable salt thereof.

2. A compound according to claim 1 selected from the group consisting of:
Ar1 and Ar2, are independently, selected from the group consisting of
optionally substituted phenyl and optionally substituted monocyclic heteroaryl;

W⁺ is an optionally substituted saturated or partially unsaturated 4-10
5 membered ring system in which one or more rings contain one or more
quaternary ammonium nitrogens, and optionally contain one or more secondary
nitrogens, or tertiary nitrogens;

Z⁻ is a pharmaceutically acceptable counter ion, selected from the group
consisting of I⁻, Br⁻, Cl⁻, F⁻, CF₃COO⁻, mesylate, and tosylate;

10 X is C(R1)_p, m is 1;

p is 2;

n is an interger from 1 to 3;

Y is C(O), or S(O)_q; wherein, q is 1 or 2;

R1 is hydrogen;

15 R2 is selected from the group consisting of hydrogen, optionally
substituted C₁-C₁₀ alkyl, optionally substituted alkenyl, optionally substituted
C₃-C₁₀ cycloalkyl, optionally substituted C₃-C₁₀ cycloalkyl alkyl, optionally
substituted heterocyclic, optionally substituted heterocyclicalkyl, optionally
substituted aryl, optionally substituted aryl alkyl, optionally substituted
20 heteroaryl, and optionally substituted heteroaryl alkyl;

R3 is selected from the group consisting of optionally substituted aryl,
optionally substituted heteroaryl, optionally substituted alkenyl, optionally
substituted C₁-C₁₀ alkyl, optionally substituted C₃-C₁₀ cycloalkyl, and
optionally substituted C₃-C₁₀ cycloalkyl alkyl; wherein, when substituted, a
25 group is substituted by one or more radicals selected from the group consisting
of halogen, cyano, hydroxy, hydroxy substituted C₁-10alkyl, C₁-10 alkoxy,
S(O)_{m'} C₁-10 alkyl, C(O)R₄, C(O)NR₄R₅; C(O)OH; S(O)₂NR₄R₅, NHC(O)R₄,
NHS(O)₂R₄, C₁-10 alkyl, alkenyl, halosubstituted C₁-10 alkyl, optionally
substituted aryl, optionally substituted arylalkyl, optionally substituted
30 heteroaryl, optionally substituted heteroaryl alkyl, wherein these aryl or
heteroaryl moieties may be substituted one to two times by halogen, hydroxy,

hydroxy substituted alkyl, C₁₋₁₀ alkoxy, S(O)_{m'}C₁₋₁₀ alkyl, C₁₋₁₀ alkyl, or halosubstituted C₁₋₁₀ alkyl; and m' is 0, 1, or 2;

R₄ and R₅, are independently, selected from the group consisting of hydrogen, optionally substituted C₁₋₁₀ alkyl, optionally substituted alkenyl, optionally substituted C_{3-C10} cycloalkyl, optionally substituted C_{3-C10} cycloalkyl alkyl, optionally substituted aryl, optionally substituted aryl alkyl, optionally substituted heteroaryl, and optionally substituted heteroaryl alkyl; or R₄ and R₅ together with the nitrogen to which they are attached form a 5 to 7 member ring which may optionally comprise an additional heteroatom selected from O, and S; and

R₇ and R₈, are independently, selected from the group consisting of hydrogen, optionally substituted C₁₋₁₀ alkyl, optionally substituted alkenyl, optionally substituted C_{3-C10} cycloalkyl, optionally substituted C_{3-C10} cycloalkyl alkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted heteroaryl, optionally substituted heteroarylalkyl, optionally substituted heterocyclic, and optionally substituted heterocyclicalkyl; or R₇ and R₈ together with the nitrogen to which they are attached form a 5 to 7 member ring which may optionally comprise an additional heteroatom selected from O, N and S;

or any other pharmaceutically acceptable salt thereof.

3. A compound according to claim 1 selected from the group consisting of: Ar₁ and Ar₂, are independently, optionally substituted phenyl;

W⁺ is an optionally substituted saturated or partially unsaturated 5-8 membered ring system in which one or more rings contain one or more quaternary ammonium nitrogens, and optionally contain one or more secondary nitrogens, or tertiary nitrogens;

Z⁻ is a pharmaceutically acceptable counter ion, selected from the group consisting of I⁻, Br⁻, Cl⁻, F⁻, CF₃COO⁻, mesylate, and tosylate;

X is C(R₁)_p;

R₁ is hydrogen

p is 2;

m is 1;

n is 1;

Y is C(O), or S(O)_q; wherein, q is 1 or 2;

5 R₂ is selected from the group consisting of hydrogen, optionally substituted C₁-C₁₀ alkyl, optionally substituted alkenyl, optionally substituted C₃-C₁₀ cycloalkyl, optionally substituted C₃-C₁₀ cycloalkyl alkyl, optionally substituted heterocyclic, optionally substituted heterocyclic alkyl, optionally substituted aryl alkyl, and optionally substituted heteroaryl alkyl;

10 R₃ is selected from the group consisting of optionally substituted aryl, optionally substituted heteroaryl, optionally substituted alkenyl, optionally substituted C₁-C₁₀ alkyl, optionally substituted C₃-C₁₀ cycloalkyl, and optionally substituted C₃-C₁₀ cycloalkyl alkyl; wherein, when substituted, a group is substituted by one or more radicals selected from the group consisting
15 of halogen, cyano, hydroxy, hydroxy substituted C₁-10 alkyl, C₁-10 alkoxy, S(O)_{m'} C₁-10 alkyl, C(O)R₄, C(O)NR₄R₅; C(O)OH; S(O)₂NR₄R₅, NHC(O)R₄, NHS(O)₂R₄, C₁-10 alkyl, alkenyl, and halosubstituted C₁-10 alkyl; wherein m' is 0, 1, or 2;

R₄ and R₅, are independently, selected from the group consisting of
20 hydrogen, optionally substituted C₁-10 alkyl, optionally substituted alkenyl, optionally substituted C₃-C₁₀ cycloalkyl, optionally substituted C₃-C₁₀ cycloalkyl alkyl, optionally substituted aryl, optionally substituted aryl alkyl, optionally substituted heteroaryl, and optionally substituted heteroaryl alkyl; or R₄ and R₅ together with the nitrogen to which they are attached form a 5 to 7
25 member ring which may optionally comprise an additional heteroatom selected from O, and S; and

R₇ and R₈, are independently, selected from the group consisting of
hydrogen, optionally substituted C₁-10 alkyl, optionally substituted alkenyl,
optionally substituted C₃-C₁₀ cycloalkyl, optionally substituted C₃-C₁₀
30 cycloalkyl alkyl, optionally substituted aryl, optionally substituted arylalkyl,

optionally substituted heteroaryl, optionally substituted heteroarylalkyl, optionally substituted heterocyclic, and optionally substituted heterocyclicalkyl; or R₇ and R₈ together with the nitrogen to which they are attached form a 5 to 7 member ring which may optionally comprise an additional heteroatom

5 selected from O, N and S;

or any other pharmaceutically acceptable salt thereof.

4. A compound according to claim 1 selected from the group consisting of:

1-methyl-1-({3'-[({4-(methyloxy)phenyl}sulfonyl)amino)methyl]-3-

10 biphenyl)methyl)piperidinium trifluoroacetate;

1-[(3'-[(1,3-benzodioxol-5-ylcarbonyl)amino)methyl]-3-

biphenyl)methyl]-1-methylpiperidinium trifluoroacetate;

1-[(3'-[(1,3-benzodioxol-5-ylcarbonyl)amino)methyl]-3-

biphenyl)methyl]-1-methylpiperazin-1-ium trifluoroacetate - trifluoroacetic acid

15 (1:1);

1,1-dimethyl-4-({3'-[({4-(methyloxy)phenyl}sulfonyl)amino)methyl]-3-

biphenyl)methyl)piperazin-1-ium trifluoroacetate - trifluoroacetic acid (1:1);

4-[(3'-[(1,3-benzodioxol-5-ylcarbonyl)amino)methyl]-3-

biphenyl)methyl]-1,1-dimethylpiperazin-1-ium trifluoroacetate - trifluoroacetic

20 acid (1:1);

1-[(3'-[(1,3-benzodioxol-5-ylcarbonyl)amino)methyl]-3-

biphenyl)methyl]-1-methyl-3-oxopiperazin-1-ium trifluoroacetate;

4-[(3'-[(1,3-benzodioxol-5-ylcarbonyl)amino)methyl]-3-

biphenyl)carbonyl]-1,1-dimethylhexahydro-1*H*-1,4-diazepin-1-ium

25 trifluoroacetate - trifluoroacetic acid (1:1); and

4-[(3'-[(3-cyanophenyl)carbonyl)amino)methyl]-3-biphenyl)methyl]-

1,1-dimethylpiperazin-1-ium trifluoroacetate - trifluoroacetic acid (1:1);

or any other pharmaceutically acceptable counter ion and/or salt.

30 5. A pharmaceutical composition for the treatment of muscarinic acetylcholine receptor mediated diseases comprising a compound according to claim 1 and a pharmaceutically acceptable carrier thereof.

6. A method of inhibiting the binding of acetylcholine to its receptors in a mammal in need thereof comprising administering a safe and effective amount of a compound according to claim 1.

5

7. A method of treating a muscarinic acetylcholine receptor mediated disease, wherein acetylcholine binds to said receptor, comprising administering a safe and effective amount of a compound according to claim 1.

10 8. A method according to claim 7 wherein the disease is selected from the group consisting of chronic obstructive lung disease, chronic bronchitis, asthma, chronic respiratory obstruction, pulmonary fibrosis, pulmonary emphysema and allergic rhinitis.

15 9. A method according to claim 8 wherein administration is via inhalation via the mouth or nose.

10. A method according to claim 9 wherein administration is via a medicament dispenser selected from a reservoir dry powder inhaler, a multi-
20 dose dry powder inhaler or a metered dose inhaler.

11. A method according to claim 10 wherein the compound is administered to a human and has a duration of action of 12 hours or more.

25 12. A method according to claim 11 wherein the compound has a duration of action of 24 hours or more.

13. A method according to claim 12 wherein the compound has a duration of action of 36 hours or more.